

Application/Control Number: 10/763,138

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1. A method of determining the presence of phycocyanin-pigmented algae or bacteria in water from light reflected therefrom, said method comprising the steps of:

(a) obtaining a measurement of reflected light from said water, said measurement comprising a measurement of the respective amount of light in at least five frequency ranges: (i) from about 0.45 μm to about 0.52 μm (ii) from about 0.63 μm to about 0.69 μm ; (iii) from about 0.76 μm to about 0.90 μm ; (iv) from about 1.55 μm to about 1.75 μm and (v) from about 2.08 μm to about 2.35 μm ; and

(b) relating the approximate amount of said phycocyanin in said water to said respective amounts of light by applying an algorithm relating said respective amounts of light in said at least five frequency ranges to the amount of phycocyanin algae or bacteria in said water.

2. A method according to claim 1 wherein said measurement of the amount of light in said at least five frequency ranges comprises the measurement, respectively, of: (i) LANDSAT TM band 1, (ii) LANDSAT TM band 3, (iii) LANDSAT TM band 4, (iv) LANDSAT TM band 5 and (v) LANDSAT TM band 7.

3. A method according to claim 2 wherein said algorithm is any algorithm selected from the group consisting of: $X = K_1 - K_2 \times (R31) + K_3 \times (R41) - K_4 \times (R43) - K_5 \times (R53) + K_6 \times (R73) - K_7 \times (R74)$ and equivalents wherein:

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X is the approximate amount of phycocyanin algae expressed in micrograms per liter;

K_1 is a value in the range of from about 30 to about 60;

K_2 is a value in the range of from about 5 to about 15;

K_3 is a value in the range of from about 20 to about 35;

K_4 is a value in the range of from about 100 to about 130;

K_5 is a value in the range of from about 3 to about 10;

K_6 is a value in the range of from about 30 to about 50;

K_7 is a value in the range of from about 5 to about 20;

R31 is the value of LANDSAT TM band 3 divided by LANDSAT TM band 1, after subtraction for atmospheric haze separately in each band;

R41 is the value of LANDSAT TM band 4 divided by LANDSAT TM band 1, after subtraction for atmospheric haze separately in each band;

R43 is the value of LANDSAT TM band 4 divided by LANDSAT TM band 3, after subtraction for atmospheric haze separately in each band;

R53 is the value of LANDSAT TM band 5 divided by LANDSAT TM band 3, after subtraction for atmospheric haze separately in each band;

R73 is the value of LANDSAT TM band 7 divided by LANDSAT TM band 3, after subtraction for atmospheric haze separately in each band; and

R74 is the value of LANDSAT TM band 7 divided by LANDSAT TM band 4, after subtraction for atmospheric haze separately in each band.

4. A method according to claim 6 wherein:

X is the amount of phycocyanin algae expressed in micrograms per liter;

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K_1 is a value in the range of from about 45 to about 50;

K_2 is a value in the range of from about 7 to about 11;

K_3 is a value in the range of from about 25 to about 35;

K_4 is a value in the range of from about 110 to about 120;

K_5 is a value in the range of from about 5 to about 8;

K_6 is a value in the range of from about 35 to about 45; and

K_7 is a value in the range of from about 10 to about 15;

5. A method according to claim 6 wherein:

X is the amount of phycocyanin algae expressed in micrograms per liter;

K_1 is a value in the range of from about 46 to about 48;

K_2 is a value in the range of from about 8 to about 10;

K_3 is a value in the range of from about 27 to about 30;

K_4 is a value in the range of from about 115 to about 120;

K_5 is a value in the range of from about 6 to about 8;

K_6 is a value in the range of from about 38 to about 43; and

K_7 is a value in the range of from about 13 to about 15;

6. A method according to claim 1 wherein the calculated value of phycocyanin correlates to the actual measured amount of said phycocyanin in said water by a correlation value in excess of 60%.

7. A method according to claim 1 wherein the calculated value of phycocyanin correlates to the actual measured amount of said phycocyanin in said water by a correlation value in excess of 70%.

8. A method according to claim 5 wherein the calculated value of X correlates to the actual measured amount of said phycocyanin in said water by a correlation value in excess of 60%.
9. A method according to claim 5 wherein the calculated value of X correlates to the actual measured amount of said phycocyanin in said water by a correlation value in excess of 70%.
10. A method according to claim 1 additionally comprising the step of transmitting data relating to the approximate amount of said phycocyanin to a site remote from the site where said measurement takes place.
11. A method according to claim 5 additionally comprising the step of transmitting data relating to the approximate amount of said phycocyanin in said water to a site remote from the site where said measurement takes place.
12. A method of determining the presence of phycocyanin algae or bacteria in water from light reflected therefrom, said method comprising the steps of:
 - (a) obtaining a measurement of reflected light from said water, said measurement comprising a measurement of the respective amount of light in at least four frequencies comprising, respectively: (i) LANDSAT TM band 1, (ii) LANDSAT TM band 3, LANDSAT TM band 5, and (iv) LANDSAT TM band 7;
 - and (b) relating the approximate amount of said phycocyanin in said water to said respective amounts of light by applying an algorithm relating said respective amounts of light in said at least five frequency ranges to the amount of phycocyanin algae in said water, wherein said algorithm is any algorithm

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selected from the group consisting of: $X = K_1 - K_2 \times (R31) + K_3 \times (R41) - K_4 \times (R43) - K_5 \times (R53) + K_6 \times (R73) - K_7 \times (R74)$ and equivalents wherein:

X is the approximate amount of phycocyanin algae expressed in micrograms per liter;

K₁ is a value of about 48;

K₂ is a value of about 9;

K₃ is a value of about 30;

K₄ is a value of about 118;

K₅ is a value of about 7;

K₆ is a value of about 42;

K₇ is a value of about 15;

R31 is the value of LANDSAT TM band 3 divided by LANDSAT TM band 1, after subtraction for atmospheric haze separately in each band;

R41 is the value of LANDSAT TM band 4 divided by LANDSAT TM band 1, after subtraction for atmospheric haze separately in each band;

R43 is the value of LANDSAT TM band 4 divided by LANDSAT TM band 3, after subtraction for atmospheric haze separately in each band;

R53 is the value of LANDSAT TM band 5 divided by LANDSAT TM band 3, after subtraction for atmospheric haze separately in each band;

R73 is the value of LANDSAT TM band 7 divided by LANDSAT TM band 3, after subtraction for atmospheric haze separately in each band; and

R74 is the value of LANDSAT TM band 7 divided by LANDSAT TM band 4, after subtraction for atmospheric haze separately in each band.

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13. A method according to claim 1 additionally comprising the step of transmitting data relating to the approximate amount of said phycocyanin in said water to a site remote from the site where said measurement takes place.

14. A method according to claim 12 additionally comprising the step of generating a report of said approximate amount of said phycocyanin in said water.

15. A method according to claim 12 additionally comprising the step of transmitting data relating to the approximate amount of said phycocyanin in said water to a site remote from the site where said measurement takes place.

FIG. 10 is a flowchart of the method of determining the presence of phycocyanin in water from light reflected therefrom, said method comprising the steps of:

16. A method of determining the presence of phycocyanin algae in water from light reflected therefrom, said method comprising the steps of:

(a) obtaining a measurement of reflected light from said water, said measurement comprising a measurement of the respective amount of light in at least five frequency ranges: (i) from about 0.45 μm to about 0.52 μm ; (ii) from about 0.63 μm to about 0.69 μm ; (iii) from about 0.76 μm to about 0.90 μm ; (iv) from about 1.55 μm to about 1.75 μm ; and (v) from about 2.08 μm to about 2.35 μm ;

transmitting data relating to said measurement to a site remote from said measurement device; and relating the approximate amount of said phycocyanin expressed in micrograms per liter in said water to said respective amounts of light at said remote site by applying an algorithm relating said respective amounts of light in said at least five frequency ranges to the amount of

phycocyanin algae in said water.

17. A method according to claim 16 additionally comprising the step of
generating a report of said approximate amount of said phycocyanin in said
water.

Cancelled claims 18-37

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